



Subsurface Pathways of Warm Waters Towards Greenland Glaciers

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Warm ocean waters melt glaciers around Greenland, but how do the offshore waters reach the coastal fjords and glacier termini? We here synthesize observations from ship-based surveys and moored instrumentation of ocean property and current distributions off East Greenland to the north of Denmark Strait. Historical observations of early Danish and Norwegian explorers are compared against recent data from expeditions that include surveys of R/V Polarstern 2014 to 2017 and F/S Maria S. Merian 2018.

Our data reveal that canyon and trough systems dominate the exchange of warm waters across the continental shelves off East Greenland between 70 N and 80 N latitude. Tides are weak as are local wind-driven motions in seasonally ice-covered seas. More specifically, warm Atlantic waters reside at depths below 200-m and seaward of the 1000-m isobath. We find warmer temperatures and enhanced onshore flows preferentially along the northern slopes of many canyons off East Greenland. These dynamically wide canyons thus constitute pathways that connect the deep offshore ocean with fjords and glaciers on the coast. Horizontal and vertical current shears suggest linear dynamics that include rotationally controlled topographic waves with periods larger than 5 days.